At 38° C. polyps did not regenerate, but died. Hence the optimum lies between 30° and 38° C. *H. grisea*, at the room temperature (18–24° C.), regenerates more slowly than *H. viridis;* but it is relatively more accelerated by the increased temperature.

Experiments upon the relative effect of light of different wavelengths resulted negatively; but these experiments do not seem to have been carried out very thoroughly.

Organisms and Oxygen.[1] — That oxygen is necessary to the life of organisms is a dogma which seemed to have received a severe shock when the facts of anærobic bacteria (which are killed by the presence of free oxygen) became known.

Errara points out that after all this necessity for oxygen is one of degree. As there are certain species which need a large amount of oxygen, so there are others which have a very low optimum of oxygen supply; such are the anærobic forms. In the presence of a larger amount of oxygen they thrive less well, and may even die.

The Phylogenetic Significance of Protozoan Nuclei.[2] — The minute structure of the nuclei of Tetramitus, Microglena, Synura, Chilomonas, Trachelomonas, Stylonychia, Amœba, Euglena, Ceratium, Peridinium, and Noctiluca has been carefully investigated by Mr. G. N. Calkins. A considerable variety of nuclear types is recognized, the simplest of which is the distributed nucleus, which consists of isolated chromatin granules scattered about in the cell. Nuclear membrane and linin threads are absent; there is, however, a cytoplasmic body near which the chromatin granules gather at the time of division; the activity of this body is analogous to that of the centrosphere of more highly organized cells. Nuclear conditions of this type are found in Tetramitus. A higher form of structure is found in the "intermediate" type of nucleus which occurs in Microglena, Synura, Chilomonas, the euglenoids, in which the attraction-sphere is intranuclear, definite in form, deeply staining and active, and the chromatin granules are massed about it permanently, as in the forms just mentioned, or only during division, as in Paramœba. A nuclear membrane is found in the case of some nuclei of this "intermediate type." In higher types of nuclei the attraction-sphere is no longer intranuclear, but this position of vantage is taken by

[1] Errara, L. Tous les êtres vivants ont-ils besoin d'oxygène libre? *Rev. Scientifique*, (4) X, 688, 689, 26 Nov., 1898.

[2] Calkins, Gary N. The Phylogenetic Significance of Certain Protozoan Nuclei, *Annals N.Y. Acad. Sci.*, vol. xi (1898), pp. 379–400, Pl. XXXV.

the central spindle during division as in Noctiluca and many Metazoa. A distinct centrosome was found only in Noctiluca. The nuclei of most Protozoa belong, however, to aberrant types, which seem to have developed along divergent paths and only remotely resemble the more primitive forms on the one hand and the higher forms on the other. Examples of these aberrant types are found in *Amœba proteus*, Ceratium, Noctiluca, and the Infusoria in general. Chromosome formation is first seen in flagellates in the form of rods which arise by the union of the scattered chromatin granules. They form in the typical, though primitive, metazoan manner in Noctiluca and Euglypha, and all metazoan cells pass through these stages in preparing for mitosis.

C. A. K.

The Plotting of Biological Data in which it is necessary to exhibit an enormous range of numbers, as, for example, in certain lines of plankton work, presents a practical difficulty which may be obviated by a simple method suggested by Mr. D. J. Scourfield.[1] This is the use of logarithmically ruled paper, or of ordinary cross-section paper by the assignment of suitable values to the lines. Thus millimeter paper may be used if the centimeter lines are held to represent 1, 10, 100, 1000, etc., and the intermediate millimeter lines are given the numerical values whose logarithms are 0.1, 0.2, 0.3, 0.4, etc. For ordinary biological data, logarithmic ruling in one direction only is required, though for certain problems, *e.g.*, the plotting of variations of a rapidly increasing number of organisms, paper ruled in this manner in both directions might be used. This method of graphic presentation of biological statistics has the additional advantage of exhibiting *proportionate* changes in numbers by lines having the same angle of slope wherever situated in the chart.

C. A. K.

ZOÖLOGY.

Relationships of North American Grouse and Quail. — Dr. H. L. Clark has just published one of his useful papers on the feather-tracts of birds; in this case on those of the North American grouse and quail. The work of Nitzsch is thus carried on and[2] extended,

[1] Scourfield, D. J. The Logarithmic Plotting of Certain Biological Data, *Journ. Quek. Micr. Club*, Ser. II, vol. iv (1897), pp. 419–423, Pl. XX.

[2] Clark, Hubert Lyman, Ph.D., Instructor in Zoology, Amherst College. The